Limited Penetration of Governance and Conflict in Sub-Saharan Africa

Shahriar Kibriya, Zhicheng Phil Xu, and Yu Zhang*

Abstract By exploiting a geo-coded disaggregated dataset in sub-Saharan Africa over 1997–2013, this paper investigates the penetration of governance structures in the context of conflict. While adverse rainfall shocks increase the conflict risk in sub-Saharan Africa, the improvement in governance quality can effectively mitigate the detrimental effect of rainfall shocks on regional peace. However, due to the limited penetration of countrywide governance structures, this effect appears strong only in the areas close from the capital cities but decays in the remote areas.

Keywords: conflict, rainfall shocks, governance, Africa
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1. Introduction

Conflict has been widespread in the recent decades, particularly in the developing countries. Economists document various major causes of conflicts, such as religion, poverty, historical legacy, etc (See Blattman and Miguel (2010) for an overview). The cornerstone research by Miguel *et al*. (2004) (henceforth MSS) documented the strong causal effect of adverse income shocks on civil conflict in sub-Saharan Africa (SSA) before 2000, using year-to-year rainfall

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variation to instrument economic growth. Their subsequent study (Miguel and Satyanath, 2011) suggests that the relationship between rainfall and economic outcomes became weaker after 2000, which might be driven by the gradual progress of governance in African countries. This inspired us to investigate the role of institution in the relationship between weather shocks and the regional conflicts in SSA.

The institutional view asserts that institutional structures, including efficient constraints on the executive, property rights protection, rule of law, are fundamental for economic development and public welfare (Acemoglu *et al*., 2005, Besley and Persson, 2011). But the role of institution in mitigating the detrimental effect of economic shocks on conflict has not been paid enough attention.

By exploiting a geo-coded disaggregated dataset in SSA over 1997–2013, we estimate the impact of rainfall shocks on the conflict risk conditional on the governance quality.[1] We hightlight that while adverse rainfall shocks increase the conflict risk in SSA, the better countrywide governance can effectively mitigate the detrimental effect of rainfall shocks on regional peace.

Nevertheless, the country level measure may overrate the governance quality in the remote areas, since most African governments are unable to broadcast power in the regions far from the capital cities (Herbst, 2014, Michalopoulos and Papaioannou, 2014). In a closer examination, we also find the role of national governance sharply diminishes along with the distance to the capital cities. The countrywide governance quality affects the relationship between rainfall shocks and conflict risk only in the areas close to the capital cities. Better performing national governance cannot translate into a stronger resistance to the adverse economic pressure in the areas far from the capital cities.

[1] The governance quality is measured at the country level, while all other variables in our dataset are disaggregated to grid level. More details will be illustrated in the next section.

Our study is related to several strands of the prior literature. Firstly, it relates to a substantial quantitative literature in the relationship between weather shocks and conflict. After MSS (2004), many subsequent empirical studies began to explore the relationship between climate variability and conflict, e.g. in SSA (Burke *et al*., 2009, Couttenier and Soubeyran, 2014), Somalia (Maystadt *et al*., 2013), Kenya (Adano *et al*., 2012, Theisen, 2012), historical China (Bai and Kung, 2011, Jia, 2014), Muslim–Hindu violence in India (Bohlken and Sergenti, 2010), and so on (see Dell *et al*. (2014) for a comprehensive overview). Nevertheless, this strand of research that exploits either country level dataset or country case study has some inherent limitations. The subnational level variables could be misspecified in the cross country analysis, while the results from country case studies are difficult to be generalized due to the external validity problem. Therefore, many researchers suggest using more detailed disaggregated data to improve our understanding of these open questions (Blattman and Miguel, 2010, Ciccone, 2011, Miguel and Satyanath, 2011). Our study circumvents the limitation in this literature with a comprehensive disaggregated dataset in SSA over period of 1997-2013.[2]

Another major contribution of our paper to the literature is the investigation of the role of institution in the context of conflict in SSA. The previous studies demonstrate that institutional quality is essential for economic growth (Acemoglu *et al*., 2001, Acemoglu, *et al*., 2005), health (Besley and Kudamatsu, 2006), reducing income inequality (Alesina and Rodrik, 1994), control of corruption (Ades and Di Tella, 1999), alleviation of famines (Besley and Burgess, 2002), reducing ethnic favoritism in public expenditure (Burgess *et al*., 2015), etc. Our study underscores that governance quality is a critical determinant mitigating civil conflict upon adverse weather shocks in SSA. More interestingly, we further

[2] To our knowledge, Harari and La Ferrara (2012) and Hodler and Raschky (2014) are a few exceptional studies exploring the relationship between rainfall shocks and conflicts using disaggregated data in Africa. Our analysis mainly focus on the impact of governance quality in terms of the conflict risk resulting from economic shocks.

distinct the overall effect from the heterogeneous effect of governance quality associated with the distance to the capitals, uncovering the limited penetration of institutional structures in the remote areas. In this regard, our study is in line with a recent literature on the interplay between institution and distance to the capitals. The Europeans' settlement in Africa was very limited to the coastline and the capital cities. Hence the colonial institutional structures, reflected via persistence on the contemporary national institutions, have decayed effect on the areas far from the capital cities (Herbst, 2014). Michalopoulos and Papaioannou (2014) emphasize that national institutions correlate with subnational development of Africa only in the areas close to the capital cities. They show the evidence from the Afrobarometer Surveys that the perceived law enforcement and state presence decline sharply with the distance to the capital cities.[3] Adding to this literature, we find the evidence of limited penetration of governance in alleviating the effect of adverse shocks on conflict in SSA. The effect of countrywide governance sharply decays in the remote areas.

The remainder of this paper proceeds as follows. Section 2 documents our data. In section 3 we illustrate the empirical strategy. Section 4 presents the econometric results. Section 5 concludes.

2. Data and Measurement

The starting step of constructing our dataset is to divide the SSA continent into pixels of 1 degree of latitude × 1 degree of longitude, approximately 110 × 110 KM near the equator, or 96 × 96 KM at 30 degrees of latitude. Then, we collect geo-referenced data and assign them into each cell. Our sample consists of 1742 cells from 44 SSA countries over the period of 1997-2013. The panel structure of

[3] Similar phenomenon has also been found in the European history. Stasavage (2010) suggests that the distances from European capital cities had an impact on the historical development of institutions through decayed accountablity.

this data allows us to control the pixel level heterogeneity and the conflict evolution over years. Descriptive statistics are reported in Table 1.

[Insert Table 1 Here]

2.1. Conflict

Data on civil conflicts, our dependent variable, are collected from the ACLED (Armed Conflict Location and Event Data) (Raleigh *et al*., 2010). Regarded as the most comprehensive data, ACLED records a range of civil conflicts in African states, including battles, violence against civilians, remote violence, rioting and protesting against a government, and non-violent conflict within the context of the war. We then denote a dummy conflict indicator as $conflict_{it}$, which is coded as one if at least one type of civil conflict event occurred in cell i in year t. Figure 1 maps the prevalence of conflicts in SSA. For example, in most years over 1997-2013, countries such as Somalia and Democratic Republic of Congo have been under conflicts.

[Insert Figure 1 Here]

2.2. Rainfall

Another primary variable of interest is rainfall. Rainfall data are drawn from the Climate Research Unit (CRU) at the University of East Anglia, which provides monthly precipitation data on a 0.5 × 0.5 degree grid. We choose the period over 1960-2013 and transfer the original monthly data into 1 × 1 degree grid. Figure 2 maps the spatial distribution of average historical annual rainfall level in Africa over 1960-2010.

[Insert Figure 2 Here]

We firstly construct a measure of rainfall shock by annual rainfall growth, calculated as $(rainfall_t - rainfall_{t-1})/rainfall_{t-1}$. This measure is the most frequently used in the literature, such as Miguel, $et\ al$. (2004), Bohlken and Sergenti (2010) and Miguel and Satyanath (2011).

The logic behind the above measure is that agrarian economies in SSA need enough precipitations to maintain its production and stability. We also concern that not only drought, but also extreme rainstorm may impair agricultural production (Duflo and Pande, 2007). Therefore, we employ the deviation of rainfall from its historic record. Specifically, a monthly extreme deviation in a cell is defined to be one if the precipitation in this month is either above the eightieth percentile level or below the twentieth percentile level of history, otherwise zero. Then we calculate the average over twelve months to obtain the yearly deviational shock.

2.3. Governance Quality

We use World Bank's Worldwide Governance Indicators (WGI) as a proxy for governance quality. It reports six broad dimensions of governance structures for 215 economies over the period 1996-2013, namely voice and accountability, political stability and absence of violence, government effectiveness, regulatory quality, rule of law, control of corruption. Each indicator is standardized ranging from -2.5 to +2.5, with higher values indicating a higher degree of governance quality. We sum up over the six measures to construct an indicator WGI as the countrywide governance quality. Figure 3 maps the WGI scores in African countries. Average WGI in SSA countries is only about -5. And 84% countries are scored lower than zero. Only South Africa, Botswana, Senegal, Ghana, Benin, and Namibia have relatively satisfactory governance quality.

[Insert Figure 3 Here]

2.4. Other Controls

Following Collier and Hoeffler (2004) and Fearon and Laitin (2003), we include control variables accounting for regional characteristics of demography, geography, and natural resources. Figure 4 maps the population density for each cell of Africa in 2000. The data are collected by the United Nations Environment Programme/Global Resource Information Database (UNEP/GRID) that surveyed more than 109,000 administrative units in Africa and provided a 2.5 × 2.5 KM grid map. We use the measure of mountainous terrain (average elevation and its standard deviation in a cell), and distance to the seacoast to capture the geographic influence on conflicts. Mountainous terrain is assumed to be associated with conflict risk since it increases the government's costs of controlling the territory. Data on mountainous terrain are coded from GTOPO30 global digital elevation model (DEM). And the distance to the seacoast calculates the geodesic distance to the nearest coastline from the centroid of each cell by Haversine formula. Such data are drawn from Global Ministry Mapping System (GMMS version 3.2). Figure 5 and Figure 6 display the average elevation and standard deviation of elevation in each cell of Africa. We also use four dummy variables to measure the endowment of natural resources. These dummies are whether a given cell has precious metals, industrial metals, oil or gems, respectively. Data for these dummies are drawn from the Mineral Resource Data System (MRDS) by the United States Geological Survey (USGS). Figure 7 indicates the locations of those natural resources.

[Insert Figure 4-7 Here]

3. Empirical Strategy

Putting governance quality aside, the relationship between rainfall variations and conflict is

$$conflict_{ict} = \alpha + \beta R_{ic,t-1} + \gamma X_{ict} + \theta_c + \vartheta_{ct} + \varepsilon_{ict} \quad (1)$$

where $conflict_{ict}$ indicates whether the cell i in country c experienced a conflict event in the year t; $R_{ic,t-1}$ is the rainfall variation in the cell i in country c during the year $t-1$; X_{ict} is a vector of controls. θ_c indicates the country fixed effect. ϑ_{ct} captures the country-specific yearly trend. We expect that β is negative when R_{ict} takes form of growth, or positive when R_{ict} takes form of deviational shock. Since Logit and Probit models may yield biased estimates when dealing with rare events (King and Zeng, 2001), we perform a linear probability model here.

In order to investigate the role of governance in alleviating conflicts, the usual estimating equation is

$$(2) \quad conflict_{ict} = \alpha + \beta R_{ic,t-1} + \gamma_1 G_{c,t-1} + \gamma_2 R_{ic,t-1} G_{c,t-1} + \delta X_{ict} + \theta_c + \vartheta_{ct} + \varepsilon_{ict}$$

where $G_{c,t-1}$ is the measure of governance quality of country c in the previous year; γ_1 is the direct effect of the governance quality on conflict risk. The interaction term is believed to capture the mitigating effect of governance on adverse rainfall shocks in the context of conflict. The deviational shock is assumed to be positively correlated with conflict risk, i.e., $\beta > 0$. We also hypothesize that $\gamma_2 < 0$. In other words, better governance can resist the impact of deviational rainfall shocks on conflict.

However, equation (2) might bias the estimate of the impact of governance quality with rainfall growth shock, since it is possible to be either negative or positive. If γ_2 is positive, then better performing governance has a mitigating effect on the impact of negative rainfall growth on conflict. However, it simultaneously suggests that a district with better governance is more likely to experience conflicts given a positive rainfall growth. Similarly, $\gamma_2 < 0$ also suggests an intuitive contradiction. Therefore, we improve the estimating framework as

$$(3) \qquad conflict_{ict} = \alpha + \beta R_{ic,t-1} + \gamma_1 G_{c,t-1} + \gamma_2 R_{ic,t-1} G_{c,t-1} + \gamma_3 R_{ic,t-1} G_{c,t-1} * 1(R_{ic,t-1} > 0) + \delta X_{ict} + \theta_c + \vartheta_{ct} + \varepsilon_{ict}$$

While γ_2 captures the mitigating effect of governance quality on negative rainfall growth, $\gamma_2 + \gamma_3$ together indicates whether better governance structures are able to magnify the impact of positive rainfall growth in reducing conflict risk. We hypothesize that $\gamma_2 > 0$ and $\gamma_2 + \gamma_3 < 0$ with rainfall variation taking form of growth shock.

Since African governments are often lack of the ability to broadcast law enforcement and public policies to the nationwide (Michalopoulos and Papaioannou, 2014), we want to examine the penetration of governance in the context of SSA conflicts, i.e., whether the effect of better countrywide governance decays in the remote areas. So we split the samples into two groups according to their distances to the capital cities within the same country, and then perform the same regressions as in equation (3). We hypothesize that the evidence of γ_2 and $\gamma_2 + \gamma_3$ is much larger in magnitude in the areas close to the capitals than the remote areas.

We firstly display the empirical results by clustering the standard errors at the country level. Concerning potential spatial interdependence, the prior development literature usually estimates the standard errors by Conley (1999)'s method. With the panel structure data, we conduct this approach following the procedure of Hsiang (2010) that adjusts the standard errors for both spatial and intertemporal correlation.

4. Results

4.1. Rainfall and Conflict

We start with the econometric analysis without considering the effect of governance. Table 2 contains the results of equation (1). Columns 1-4 repeat the analysis with two rainfall shock measures with or without including the control variables. All exercises include country fixed effects and country specific yearly trend. Consistently with our hypotheses, a positive shock of rainfall growth can significantly lower the likelihood of conflict incidence. And a conflict is more likely to occur after an extreme deviational rainfall shock.

[Insert Table 2 Here]

4.2. Governance, Rainfall Shocks, and Conflict

Table 3 delivers the results of estimating equation (2) and (3) that explore the role of governance in the relationship between rainfall shocks and conflict incidence. It shows that the variation in conflict incidence can be partly explained by the differences in governance quality measured by WGI score. Higher governance quality is always linked with lower risk of conflict incidence. One point increase in WGI score can directly lower the likelihood of conflict incidence by about five percentage points.

[Insert Table 3 Here]

As discussed in the previous section, we hypothesize that $\gamma_2 > 0$ when rainfall variations take form of growth shocks in equation (3), but $\gamma_2 < 0$ with deviational shocks in equation (2). That is, well-functioning governance structures can effectively mitigate the impact of adverse rainfall shocks on conflict risk. And also, $\gamma_2 + \gamma_3 < 0$ in equation (3) suggests that better governance structures amplify the impact of positive rainfall growth in alleviating conflict.

In the first column of Table 3, we add the interaction term of WGI scores and rainfall growth shocks. The coefficient of γ_2 indicates that one additional increased WGI score can reduce the marginal effect of negative rainfall growth by 0.54. That is to say, well-functioning governance structures, including government accountability and effectiveness and so on, can help maintain a peaceful environment where people suffer from the economic contraction caused by drought. We also find that $\gamma_2 + \gamma_3 < 0$ in the first column of Table 3. Therefore, better performing governance can enhance the effect of good weather condition in lessening the conflict risk. In the second column, we estimate equation (2) with the interaction between WGI scores and deviational rainfall shocks. As expected, it shows that $\gamma_2 < 0$, in spite of statistical insignificance. This finding is not quite surprising since dealing with the impact of extreme rainfall shocks requires higher level governance performance, which is lacking in most of African countries. However, we find that γ_2 is significantly negative in the areas close to the capital cities as we examine the penetration of governance structure in the next subsection.

4.3. The Limited Penetration of Governance

Finally, Table 4 displays the estimating results of equation (3) by splitting the samples into two groups according to their distances to the respective capital cities. Then we can compare the role of governance in the areas close to the capitals and others far from the capitals. We begin the analysis with the results shown in panel A in which the rainfall variation is measured by rainfall growth. In the column 1 and 2, we use the median distance to the capital across all the cells within the same country as the cutoff, below or above which a cell is defined as a close or remote cell. γ_2 and $\gamma_2 + \gamma_3$ are all significant in the column 1 (close area). In contrast, in column 2 (remote area), γ_2 becomes insignificant and much smaller in magnitude, while $\gamma_2 + \gamma_3$ remains significant but toward zero. That is to say, conditional on the same level of countrywide governance quality and weather shocks, the areas close to the capital cities are less likely to emerge conflicts than in the hinterland. However, we do not know exactly how far from the capital the role of countrywide governance still holds. Therefore, we need to check whether our argument on the limited penetration of governance structures is robust to the choice of the cutoff. Accordingly, in column 3 and 4 we redefine a cell as a close area if its distance to the respective capital falls within the 10^{th} percentile of all cells in the same country, otherwise a remote area. γ_2 and $\gamma_2 + \gamma_3$ in column 3 increase considerably, compared to column 1, while they remain the same pattern in column 4 as in column 2. It suggests that the broadcast of countrywide governance structures might start to decay even within the median distant areas. Since SSA countries are different in size, using relative distance to determine the cutoff may cause potential biased estimates. For example, it could be more challenging for a large country to broadcast its countrywide governance power to the areas farther than median level distance, while a small country is easy to do so. Hence we check the robustness of our argument by applying 400 and 200 kilometers to the capital cities within the same country as the cutoffs to define far and close areas in column 5-8. The results are very similar with column 1-4. The only exception is that γ_2 is just at marginal level of significance (p=0.103) in column 7 (distance to the capital closer than 200KM).

In panel B, we repeat the same estimation procedure as panel A but replace the rainfall growth with the deviational shocks of rainfall. γ_2 is always insignificant in the far areas with different cutoff definitions. In the close areas, γ_2 is significantly negative, with only one exception in column 5, in which the cutoff is 400KM.

Panel A and B in Table 4 together support the theory of limited penetration of governance. Since the deviational shock is a stronger anomaly than negative rainfall growth by definition, national governance structures show more limited penetration with it.

[Insert Table 4 Here]

Why the areas close to the capitalcities are easier to be benefitted by the national governance in the context of conflict? Some hints can be found in Ades and Glaeser (1995) who find that the countries with poor institutional settings have bigger central cities than their democratic counterparts. The elites have strong incentive to transfer resources to the capital. And more immigrants flowing to the capital increase the voice of citizens in the capital cities. Consequently, the areas close to the capital cities receive more support from the central government in the difficult days.

5. Concluding Remarks

In this paper we conduct a geo-referenced disaggregated analysis of the empirical determinants of conflict in SSA over the period 1997-2013. We construct a rich dataset of observations of 1 degree × 1 degree of latitude longitude, including conflicts, historical record of rainfall, governance quality, as well as a set of control variables. Although it is well established that weather shocks have a strong causal effect on the likelihood of conflict in SSA, our analysis reveals that better performing governance structures make a region less prone to conflict occurrence upon adverse weather shocks.

We further our analysis to the heterogenous effect of countrywide governance in different regions within country. Our results emphasize the misgovernance in the areas far from capital cities. By splitting the samples according to their absolute and relative distance to the respective capital cities, we find the evidence of limited penetration of governance in alleviating the effect of adverse shocks on conflict in SSA. The effect of countrywide governance appears strong in the areas close to the capital cities but decays in the remote areas. Our findings call for future research on the causes of limited penetration of countrywide governance in Africa. The subsequent studies will pursue a closer examination of the institutional structures in Africa. For example, we suspect that the political participation and media accountability in the remote areas are not enough to result in effective aids from the distantly located central government. We hope more efforts will be devoted to deeper investigation of the specific mechanisms that will generate fruitful studies.

In terms of policy implications, the results of this research suggest the importance of increasing governance quality in the remote areas in SSA countries. This line of research will help to make more effective efforts to prevent political and social unrest in the developing countries.

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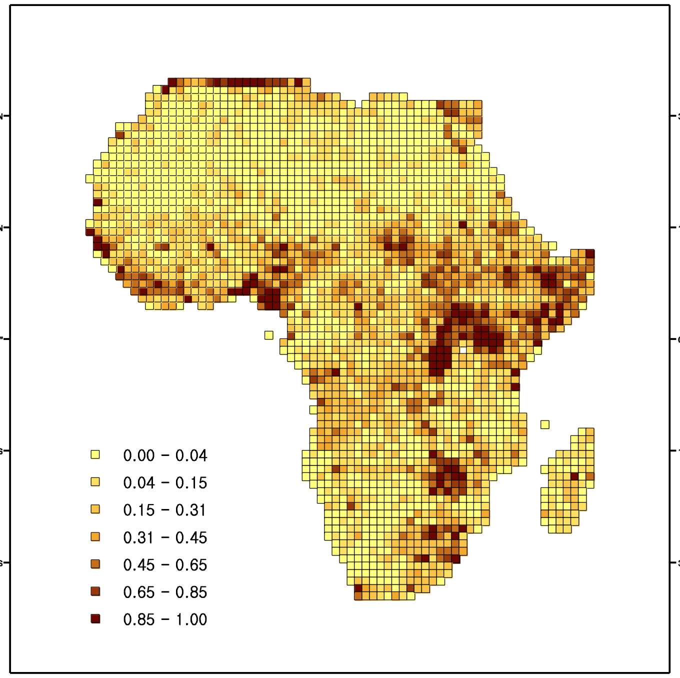

FIGURE 1 FRACTION OF SAMPLE YEARS WITH CONFLICT EVENT, 1997-2013

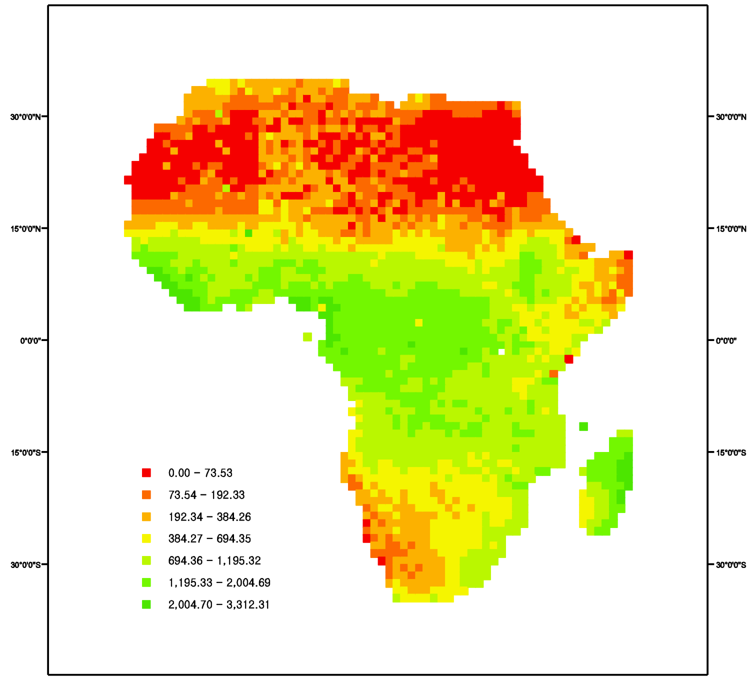

FIGURE 2 AVERAGE ANNUAL RAINFALL (MM), 1960-2010

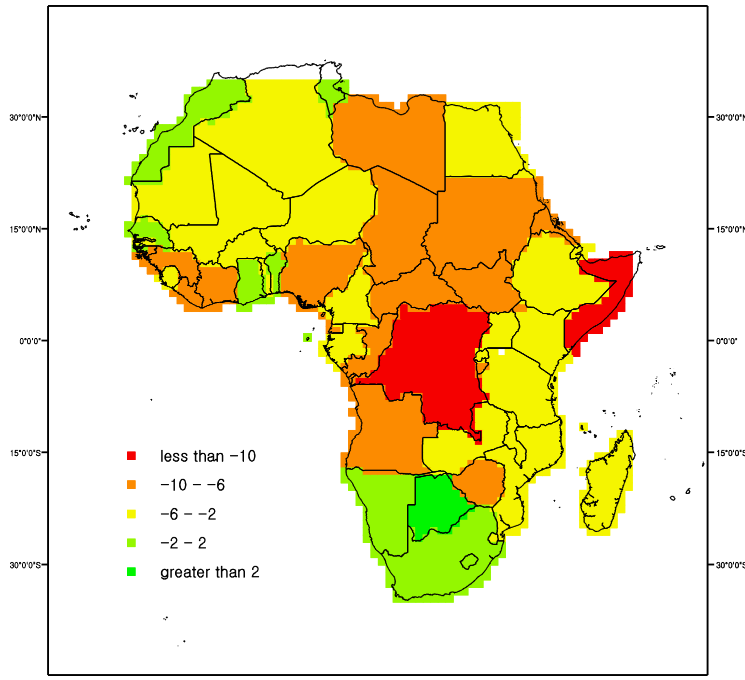

FIGURE 3 AVERAGE WGI, 1996-2013

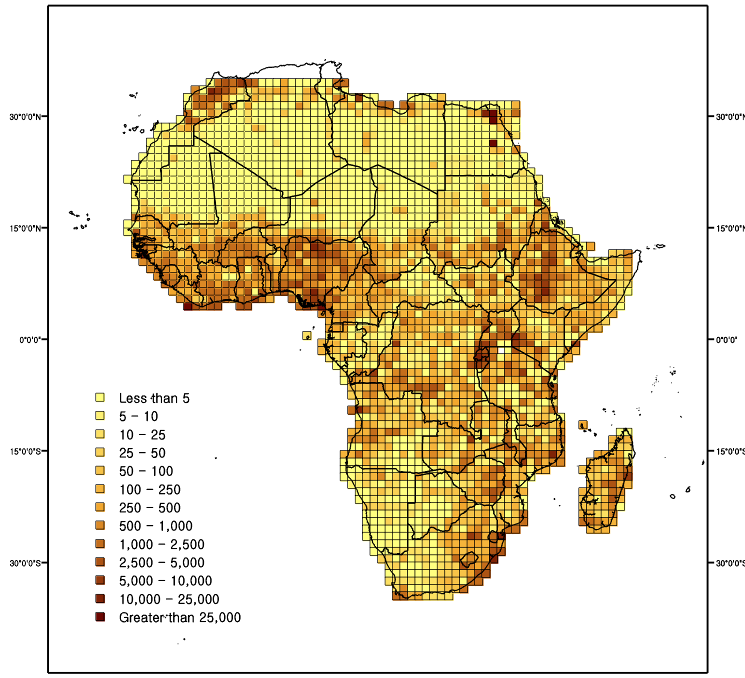

FIGURE 4 POPULATION DENSITY IN 2000

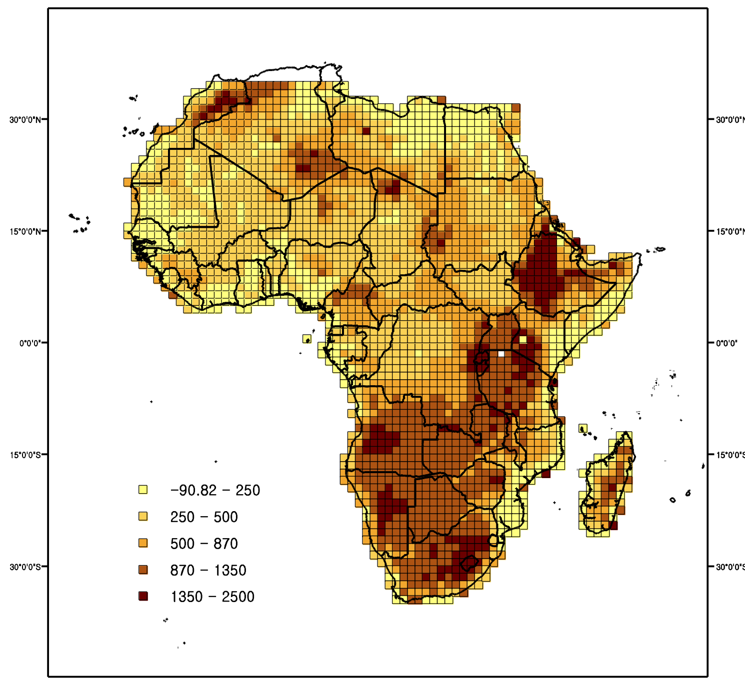

FIGURE 5 AVERAGE ELEVATION (METER)

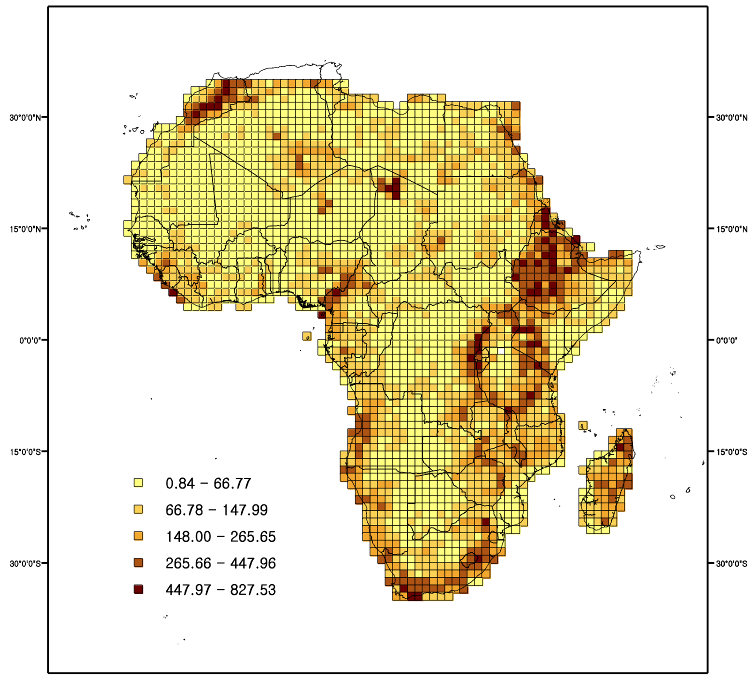

FIGURE 6 STANDARD DEVIATION OF ELEVATION

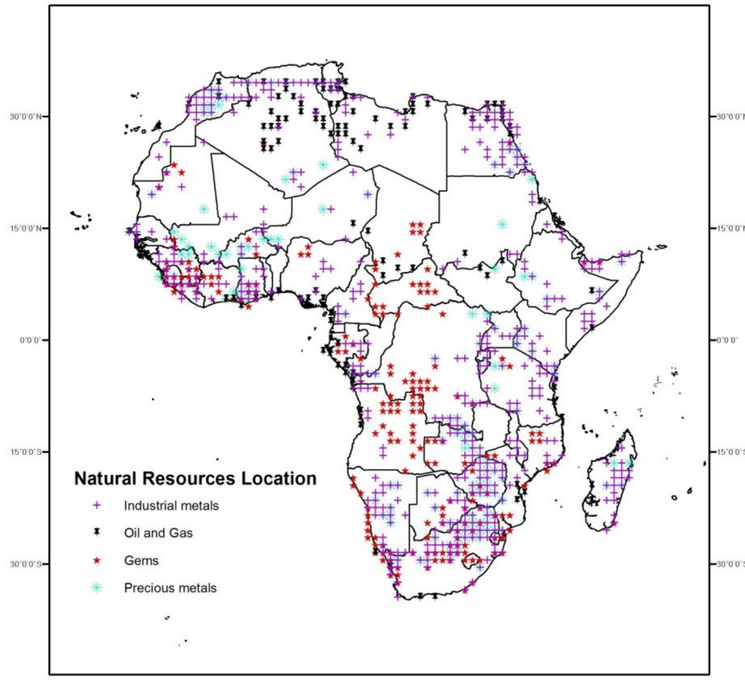

FIGURE 7 NATURAL RESOURCES LOCATION

Table 1 Descriptive Statistics

	Observations	Mean	S.D.	min	max
Panel A conflict					
Conflict event number	29614	0.400	0.793	0.000	3.000
Conflict incidence	29614	0.246	0.431	0.000	1.000
Panel B other time variant variables					
Annual rainfall	33083	945.734	583.119	0.000	5596.880
Governance (WGI)	660	-4.513	3.532	-14.946	5.206
Panel C other time invariant variables					
Precious Metal	1472	0.072	0.259	0.000	1.000
Industrial Metal	1472	0.196	0.397	0.000	1.000
Oil Gas	1472	0.029	0.167	0.000	1.000
Germs	1472	0.111	0.314	0.000	1.000
Population Density	1472	637.279	1777.509	0.000	29696
Distance to Coast	1472	562.662	401.199	0.155	1585.482
Distance to the capital	1472	550.357	380.956	11.920	1904.282
Average Elevation	1472	695.863	461.107	-90.824	2468.176
Standard Deviation of Elevation	1472	120.606	119.492	0.845	765.231

Table 2 Rainfall shocks and conflict

	(1)	(2)	(3)	(4)
Dependent var. : conflict incidence				
Rainfall growth	-0.001	-0.002		
	(0.001)*	(0.001)**		
	[0.001]*	[0.001]**		
Rainfall deviational shock			0.088	0.106
			(0.024)***	(0.024)***
			[0.016]***	[0.015]***
adj.R-squared	0.175	0.213	0.178	0.215
Controls	No	Yes	No	Yes
Country FE	Yes	Yes	Yes	Yes
Country specific trend	Yes	Yes	Yes	Yes
Observations	29602	29602	29614	29614

Notes: Standard errors clustered by country are reported in parentheses. Standard errors in the square bracket are estimated by Hsiang (2010)'s method allowing spatial and intertemporal correlation.

*** Significant at the 1 percent level.

** Significant at the 5 percent level.

* Significant at the 10 percent level.

Table 3 Governance, Rainfall Shock, and Conflict

	(1) Conflict	(2) Conflict
Rainfall growth	-0.007	
	(0.003)**	
	[0.003]**	
Rainfall deviational shock		0.105
		(0.038)***
		[0.022]***
WGI	-0.052	-0.050
	(0.018)***	(0.017)***
	[0.005]***	[0.006]***
γ_2	0.544	-0.003
	(0.272)*	(0.005)
	[0.266]**	[0.004]
γ_3	-0.546	
	(0.272)*	
	[0.266]**	
$\gamma_2 + \gamma_3$	-0.003	
	(0.001)**	
	[0.001]**	
Controls	Yes	Yes
Country FE	Yes	Yes
Country specific trend	Yes	Yes
Observations	24376	24388

Notes: Standard errors clustered by country are reported in parentheses. Standard errors in the square bracket are estimated by Hsiang (2010)'s method allowing spatial and intertemporal correlation.

*** Significant at the 1 percent level.

** Significant at the 5 percent level.

* Significant at the 10 percent level.

Table 4 Penetration of Governance, Rainfall Shock, and Conflict

	(1) Conflict	(2) Conflict	(3) Conflict	(4) Conflict	(5) Conflict	(6) Conflict	(7) Conflict	(8) Conflict
Panel A								
rainfall growth	-0.008	-0.008***	-2.547	-0.007**	-0.010	-0.010***	-3.174***	-0.006**
	(0.041)	(0.002)	(1.622)	(0.003)	(0.041)	(0.001)	(0.981)	(0.003)
WGI	-0.059***	-0.044**	-0.051***	-0.052***	-0.030**	-0.076***	-0.037*	-0.056***
	(0.019)	(0.018)	(0.014)	(0.019)	(0.014)	(0.023)	(0.021)	(0.020)
γ_2	0.964**	0.324	1.869***	0.433	1.162***	0.184	1.264	0.431
	(0.408)	(0.280)	(0.499)	(0.268)	(0.412)	(0.255)	(0.776)	(0.272)
γ_3	-1.042**	-0.327	-2.796***	-0.436	-1.239***	-0.187	-1.846**	-0.434
	(0.419)	(0.280)	(0.603)	(0.269)	(0.425)	(0.255)	(0.762)	(0.273)
$\gamma_2 + \gamma_3$	-0.078**	-0.003***	-0.927***	0.002**	-0.077***	-0.003***	-0.582***	-0.002***
	(0.036)	(0.001)	(0.279)	(0.001)	(0.037)	(0.001)	(0.129)	(0.001)
distance to capital	<50th percentile	>50th percentile	<10th percentile	>10th percentile	<400km	>400km	<200km	>200km
adj.R-squared	0.243	0.236	0.307	0.215	0.271	0.183	0.248	0.205
Observations	12534	11842	2754	21622	10564	13812	3860	20516
Panel B								
deviational shock	0.072	0.115***	0.014	0.109***	0.104**	0.081**	0.040	0.114***
	(0.054)	(0.029)	(0.075)	(0.036)	(0.050)	(0.035)	(0.078)	(0.037)
WGI	-0.053***	-0.041**	-0.045***	-0.049***	-0.027*	-0.070***	-0.032	-0.053***
	(0.018)	(0.017)	(0.015)	(0.018)	(0.015)	(0.022)	(0.021)	(0.019)
γ_2	-0.013*	-0.001	-0.019*	-0.003	-0.010	-0.005	-0.021*	-0.001
	(0.007)	(0.004)	(0.010)	(0.005)	(0.008)	(0.004)	(0.012)	(0.005)
distance to capital	<50th percentile	>50th percentile	<10th percentile	>10th percentile	<400km	>400km	<200km	>200km
adj.R-squared	0.246	0.239	0.307	0.218	0.274	0.185	0.249	0.208
Observations	12544	11844	2758	21630	10570	13818	3864	20524

Notes: Standard errors clustered by country are reported in parentheses. All regressions include controls, country-fixed effects, and country specific trend.

*** Significant at the 1 percent level.

** Significant at the 5 percent level.

* Significant at the 10 percent level.